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(54) **COLLAPSIBLE MAST OF A YACHT**

ZUSAMMENKLAPPBARER MAST EINER JACHT

MÂT PLIABLE D'UN YACHT

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Description

[0001] The present disclosure relates to a collapsible mast. More in particular the disclosure relates to a collapsible mast of or for a yacht.

[0002] Masts of yachts, especially relatively big yachts, are always fixed. However, as yacht are becoming progressively bigger, continuously extending masts pose a problem, if not a danger, under specific circumstances. In particular when sailing into marinas or under bridges, masts may engage and damage marina entrances and bridged. Consequently, there's a need for a solution.

[0003] The present disclosure is aimed at providing a solution, and to this end the mast of or for a yacht is made collapsible by comprising: a base; a top section; and a rotation mechanism arranged between the base and the top section configured to rotate the top section relative to the base between an upright extended state, in which the top section extends in line with the base, and a collapsed state, in which the top section is rotated downward to reduce a height of the mast.

[0004] According to this solution, the mast can be collapsed, when sailing towards a marina entrance or a bridge.

[0005] From DE-10- 2006 009 206 A1, a collapsible mast of a sailing boat is known to have a transverse axis, on which the top section is rotatable relative to the base. The top section is fixed to the axis, or rotatable thereon. In addition, FR 2 810 626 is acknowledged. Finally, DE 10 2009 005 240 is also acknowledged here, over which features in the characterising portion of the appended independent claim render the present disclosure novel and inventive.

[0006] More in particular, the mast exhibits features of the appended independent claim.

[0007] The mast exhibits the feature that the arm is extendible from a shorter effective length in the upright extended state to a larger effective length in the collapsed state to keep the base and the top section apart in the collapsed state and have the base and top section abut in the upright extended state. Then, the mast further exhibits the feature that the extendible arm is accommodated in a through hole in a mounting plate inside the top section, with a traction mechanism extending along the top section and back through an interior of the top section to the mounting plate. This provides a robust and secure manner of keeping the base and top section apart in the collapsed state of the mast.

[0008] The present disclosure is not limited in the disclosure extent to a mast being collapsible and encompasses many embodiments, to which the scope of protection of the disclosure is by no means limited, and which are set forth in the dependent claims and in the below embodiment description.

[0009] Then the mast may further exhibit the feature that the traction mechanism is anchored on a boom, extending sideways from the base.

[0010] In an embodiment having the mounting plate

and the boom, the mast may further exhibit the feature that the traction mechanism comprises a cable, wherein preferably the traction mechanism additionally comprises a pull, for example a spring.

[0011] Additionally or alternatively, the mast of the disclosure may exhibit the feature that the rotation mechanism comprises a track and cam mechanism configured to control respectively collapsing and erecting movement of the top section relative to the base. With a cam following a track, the movement path of the top section collapsing or being extended is more safely controlled to avoid unexpected movements, endangering personnel in the vicinity.

[0012] Additionally or alternatively, the mast of the disclosure may exhibit the feature that an interface between the base and the top section is oblique relative to the extent of the mast in the upright extended state. In such an embodiment, the interface may be at an angle of at least approximately 45 degrees.

[0013] Additionally or alternatively, the mast of the disclosure may exhibit the feature that the rotation mechanism comprises a drive motor arranged in either of the base and the top section, and a transmission connected with the drive motor and the rotation mechanism.

[0014] In such an embodiment with a drive motor and transmission, the drive motor may be at the output thereof connected with a flexidrive cable leading to the transmission.

[0015] In such an embodiment with a drive motor and transmission and potentially also a flexidrive cable, the transmission may comprise at an input side thereof a leadscrew.

[0016] In such an embodiment with a drive motor and transmission and potentially also a flexidrive cable and/or a leadscrew at the input of the transmission, the transmission may be a gearbox with spindle.

[0017] In such an embodiment with a drive motor and transmission and potentially also a flexidrive cable and/or a leadscrew at the input of the transmission and/or a gearbox with spindle, the transmission may comprise an input connected with an external connector, configured to be engaged by a manually applicable external drive, such as a drill. This allows manual override in case of drive motor failure and thereby enhanced safety.

[0018] In such an embodiment with a drive motor and transmission and potentially also a flexidrive cable and/or a leadscrew at the input of the transmission and/or a gearbox with spindle and/or external connector, the drive motor may be under control of a controller with a user input for commands to extend or collapse the top section. In such an embodiment, the user input may be arranged on or at the mast. In particular safety is enhanced when the user input is not remote, but at the mast, because - in view of progressive size increases in such yachts - remote control offers the risk of misjudging when the must should be collapsed, and when it can be allowed to be erected again.

[0019] After the above explanation of aspects of the

present disclosure in terms of features defined in the appended claims, herein below an embodiment description will follow. Therein more technical detail is provided, where it is emphasised that the detail, features, aspects, components and functionalities to be described are in no way to be interpreted as limiting on the scope of protection, unless defined in the independent appended claim(s), and then still in particular in some jurisdictions equivalents are also included in the scope. Below, in the embodiment description, reference is made to the appended drawing, in which the same or similar aspects, components, elements and functionalities may be identified using the same or similar reference signs, even if described in relation to distinct embodiments. In the drawing:

Fig. 1 shows a mast according to the disclosure in a collapsed state;

Fig. 2 shows schematically the technical working of a mast according to the present disclosure;

Fig. 3 shows more detail a side view of the interior configuration of a mast according to the present disclosure with a top section in a partially collapsed position;

Fig. 4 shows a top view corresponding with the side view of Fig. 3;

Fig. 5 shows a side view from an opposing perspective relative to Fig. 3; and

Fig. 6 shows a side view of the mast of the present disclosure in a near-erect position.

[0020] Figures 1 and 2 show a mast 1 according to the present disclosure, to have a base 2 and a collapsible top section 3. The base 2 is to be mounted on preferably a relatively large yacht. Extending sideways from the base 2 is a boom 4. The interface 5 between the base 2 and the top section 3 is oblique, allowing the top section 3 to be erected as indicated at 6 or collapsed as indicated at 7. As indicated in other figures also, a rotation mechanism is arranged between the base 2 and the top section 3. The rotation mechanism is configured to rotate the top section 3 relative to the base 2 between an upright extended state or position, indicated at 6, in which the top section 3 extends in line with the base 2, and a collapsed state or position, indicated at 7 in figure 2, in which the top section 3 is rotated downward to reduce a height of the mast on the yacht (not shown).

[0021] An arm 9 extends from a pivot 8 at base 2 into the top section 3 to carry, guide or support the top section 3. The pivot 8 is fact a transverse rotation axis 8, oriented transverse through the base 2 as is visible in figures 3-5. The axis 8 may be rotatable in the base 2 with the arm 9, or the arm 9 may be rotatable around the axis 8. Either way, the arm 9 is rotatably connected to the base 2, and the arm is connected with the base 2 via the axis 8.

[0022] More in particular, the arm 9 extends through an over-dimensioned through hole 11 in a mounting plate 10 in the interior of the top section, such that the mounting

plate 10 may travel over the arm 9, taking the entire top section 3 along, since the mounting plate is fixedly connected to the interior of the top section 3.

[0023] Thereby, the arm 9 is extendible from a shorter effective length in the upright extended state or position, into a larger effective length in the collapsed state. The effective length of arm 9 is between axis 8 and mounting plate 10, and varies with the state of the collapsible mast. This serves to keep the base 2 and the top section 3 apart in the collapsed state 7 and have the base 2 and top section 3 abut in the upright extended state 6. When the top section 3 is lowered or collapsed, the cable 12 and spring 13 assembly pulls the top section 3 away from the base 2. Clearly in fig. 2, it is discernible that the effective length of the arm 9 between the pivot 8 and the mounting plate 10 is shorter in the upright erected position 6, than in the lowered collapsed position 7.

[0024] The extendible arm 9 is accommodated in the through hole 11 in the mounting plate 10 inside the top section 3, with a traction mechanism extending along the top section 3 and back through an interior of the top section 3 to the mounting plate 10. The traction mechanism is anchored on the boom 4, extending sideways from the base 2. The traction mechanism comprises cable 12, and a pull, here a spring 13. The spring 13 connects the mounting plate 10 to cable 12. Further, the rotation mechanism comprises a track 15 and cam 14 mechanism configured to control respectively collapsing and erecting movement of the top section 3 relative to the base 2. The track 15 and cam 14 mechanism defines the path travelled by the top section 3 when being collapsed or erected / extended.

[0025] It was noted already above that interface 5 between the base 2 and the top section 3 is oblique relative to the extent of the mast 1 in the upright extended state. Preferably, the interface 5 is at an angle of at least approximately 45 degrees. Other angles of the interface 5 are by no means excluded.

[0026] As shown in figures 3-5, the rotation mechanism further comprises a drive motor 16. Here the drive motor 16 is arranged in the base 2, but it can be arranged in either of the base 2 and the top section 3. The rotation mechanism further comprises a transmission 17 connected with the drive motor 16 and the axis 8 and arm 9 of the rotation mechanism.

[0027] Here, the drive motor 16 is at the output thereof connected with a flexidrive cable 18 leading to the transmission 17. The transmission 17 comprises at an input side thereof a leadscrew in a housing, so not visible, to transfer the rotating movement from the drive motor 16 to a gear assembly in the transmission 17, and further to the arm 9 for rotating the top section 3.

[0028] The drive may be embodied as a worm drive (not shown) as an alternative for the drive motor 16 and flexidrive cable 18. Additionally or alternatively, a drive may be embodied as a direct drive, a linear actuator or any other suitable drive form or embodiment.

[0029] Preferably, the transmission 17 is a gearbox

with spindle. Alternatives are explicitly not excluded.

[0030] Further, the transmission 17 comprises an input 19 connected with an external connector 20, configured to be engaged by a manually applicable external drive, such as a drill. In this manner, the top section 3 can be made to erect or collapse, even in case of failure of the drive motor 16.

[0031] The drive motor 16 is preferably under control of a controller (not shown) with a user input 21, 22 for commands to extend or collapse the top section 3. The user inputs are locally situated, and in the embodiment of fig. 6, two user inputs 21, 22 are arranged on or at the mast, more in particular on the base 2, one for erection of the top section 3 and one for collapsing the top section 3. As an alternative, a single button 21, 22 may embody the user input, to erect the top section when collapsed or collapse the top section, when erect.

[0032] The controller may monitor top section 3 movement, based on feedback from the drive motor 16 or from sensors. In the shown embodiment of fig. 6, a proximity sensor 23 is provided to inform the control or directly slow down the motor 16, when the top section approximates the base 2 and an erect upright position 6 or state of the top section 3.

[0033] It is noted that the present disclosure encompasses many additional and/or alternative embodiments, even ones that have not been specifically shown in the appended drawing and/or described above. Such presently unforeseen embodiments are nonetheless encompassed within the scope of protection according to the appended claims.

Claims

1. Mast of or for a yacht, **characterised in that** the mast is configured to be collapsible by comprising:

- a base (2);
- a top section (3); and
- a rotation mechanism arranged between the base and the top section configured to rotate the top section relative to the base between an upright extended state (6), in which the top section extends in line with the base, and a collapsed state (7), in which the top section is rotated downward to reduce a height of the mast, wherein the rotation mechanism comprises an axis (8) oriented transverse through the base, wherein

the rotation mechanism comprises a rotation arm (9), which is rotatably connected to the base via the axis and a mounting plate (10) with a through hole (11), wherein the arm (9) is extendible from a shorter effective length in the upright extended state to a larger effective length in the collapsed state to keep the base and the top section

apart in the collapsed state and have the base and top section abut in the upright extended state, wherein

the extendible arm (9) is accommodated in the through hole (11) of the mounting plate (10) inside the top section (3), **characterized in that** the rotation mechanism further comprises a traction mechanism (12, 13) extending along the top section (3) and back through an interior of the top section to the mounting plate.

2. Collapsible mast of claim 1, wherein the traction mechanism is anchored on a boom (4), extending sideways from the base (2).
3. Collapsible mast of claim 2, wherein the traction mechanism comprises a cable (12).
4. Collapsible mast of claim 3, wherein the traction mechanism additionally comprises a pull, for example a spring (13).
5. Collapsible mast of any of the preceding claims, wherein the rotation mechanism comprises a track (15) and cam (14) mechanism configured to control respectively collapsing and erecting movement of the top section (3) relative to the base (2).
6. Collapsible mast of any of the preceding claims, wherein an interface (5) between the base (2) and the top section (3) is oblique relative to the extent of the mast in the upright extended state (6).
7. Collapsible mast of claim 6, wherein the interface (5) is at an angle of at least approximately 45 degrees.
8. Collapsible mast of any of the preceding claims, wherein the rotation mechanism comprises a drive motor (16) arranged in either of the base (2) and the top section (3), and a transmission (17) connected with the drive motor and the rotation mechanism.
9. Collapsible mast of claim 8, wherein the drive motor (16) is at the output thereof connected with a flexidrive cable (18) leading to the transmission (17).
10. Collapsible mast of claim 8 or 9, wherein the transmission (17) comprises at an input side thereof a leadscrew.
11. Collapsible mast of claim 8, 9 or 10, wherein the transmission (17) is a gearbox with spindle.
12. Collapsible mast of any of claims 8 - 11, wherein the transmission (17) comprises an input (19) connected with an external connector, configured to be en-

gaged by a manually applicable external drive, such as a drill.

13. Collapsible mast of any of claims 8 - 12, wherein the drive motor (16) is under control of a controller with a user input (21, 22) for commands to extend or collapse the top section (3).
14. Collapsible mast of claim 13, wherein the user input (21, 22) is arranged on or at the mast.
15. Collapsible mast of any of claims 8 - 14, wherein the drive motor (16) is selected from a group, comprising an electric motor, a worm drive, a direct drive, a linear actuator, or the like.

Patentansprüche

1. Ein Mast von oder für eine Yacht, **dadurch gekennzeichnet, dass** der Mast so ausgebildet ist, dass er zusammenklappbar ist, indem er folgendes aufweist:

- einen Sockel (2);
- einen oberen Abschnitt (3); und
- einen Drehmechanismus, der zwischen dem Sockel und dem oberen Abschnitt angeordnet ist, der dazu ausgebildet ist, den oberen Abschnitt relativ zu dem Sockel zwischen einem aufrechten ausgefahrenen Zustand (6), in dem sich der obere Abschnitt in einer Linie mit dem Sockel erstreckt, und einem zusammengeklappten Zustand (7) zu drehen, in dem der obere Abschnitt nach unten gedreht wird, um eine Höhe des Mastes zu verringern, wobei der Drehmechanismus eine Achse (8) aufweist, die quer durch den Sockel ausgerichtet ist, wobei

der Drehmechanismus einen Dreharm (9) aufweist, der über die Achse drehbar mit dem Sockel und einer Montageplatte (10) mit einem Durchgangsloch (11) verbunden ist, wobei

der Arm (9) von einer kürzeren effektiven Länge in dem aufrechten ausgefahrenen Zustand zu einer größeren effektiven Länge in dem zusammengeklappten Zustand ausfahrbar ist, um den Sockel und den oberen Abschnitt in dem zusammengeklappten Zustand auf Abstand zu halten und den Sockel und den oberen Abschnitt in dem aufrechten ausgefahrenen Zustand aneinanderstoßen zu lassen, wobei der ausziehbare Arm (9) in dem Durchgangsloch (11) der Montageplatte (10) innerhalb des oberen Abschnitts (3) untergebracht ist, **dadurch gekennzeichnet, dass**

der Drehmechanismus weiter einen Zugmechanismus (12, 13) aufweist, der sich entlang des oberen Abschnitts (3) und zurück durch ein Inneres des oberen Abschnitts zu der Montageplatte erstreckt.

2. Der zusammenklappbare Mast nach Anspruch 1, wobei der Zugmechanismus an einem Ausleger (4) verankert ist, der sich seitlich von dem Sockel (2) erstreckt.
3. Der zusammenklappbare Mast nach Anspruch 2, wobei der Zugmechanismus ein Kabel (12) aufweist.
4. Der zusammenklappbare Mast nach Anspruch 3, wobei der Zugmechanismus zusätzlich ein Zugelement, beispielsweise eine Feder (13), aufweist.
5. Der zusammenklappbare Mast nach einem der vorhergehenden Ansprüche, wobei der Drehmechanismus einen Schienen- (15) und Kurvenmechanismus (14) aufweist, der so ausgebildet ist, dass er die Zusammenklapp-beziehungsweise Aufrichtbewegung des oberen Teils (3) relativ zum Sockel (2) steuert.
6. Der zusammenklappbare Mast nach einem der vorhergehenden Ansprüche, wobei eine Schnittstelle (5) zwischen dem Sockel (2) und dem oberen Abschnitt (3) in Bezug auf die Erstreckung des Mastes im aufrecht ausgefahrenen Zustand (6) schräg ist.
7. Der zusammenklappbare Mast nach Anspruch 6, wobei die Schnittstelle (5) einen Winkel von mindestens etwa 45 Grad aufweist.
8. Der zusammenklappbare Mast nach einem der vorhergehenden Ansprüche, wobei der Drehmechanismus einen Antriebsmotor (16), der entweder im Sockel (2) oder im oberen Abschnitt (3) angeordnet ist, und ein Getriebe (17), das mit dem Antriebsmotor und dem Drehmechanismus verbunden ist, aufweist.
9. Der zusammenklappbare Mast nach Anspruch 8, wobei der Antriebsmotor (16) an seinem Ausgang mit einer flexiblen Antriebswelle (18) verbunden ist, die zum Getriebe (17) führt.
10. Der zusammenklappbare Mast nach Anspruch 8 oder 9, wobei das Getriebe (17) an seiner Eingangsseite eine Leitspindel aufweist.
11. Der zusammenklappbare Mast nach Anspruch 8, 9 oder 10, wobei das Getriebe (17) ein Getriebe mit Spindel ist.
12. Der zusammenklappbare Mast nach einem der Ansprüche 8 bis 11, wobei das Getriebe (17) einen Ein-

gang (19) aufweist, der mit einem externen Verbindungsstück verbunden ist, wobei das Verbindungsstück so ausgebildet ist, dass es mit einem manuell anbringbaren externen Antrieb, wie beispielsweise einer Bohrmaschine, betrieben werden kann.

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13. Der zusammenklappbare Mast nach einem der Ansprüche 8 bis 12, wobei der Antriebsmotor (16) von einer Steuerung mit einer Benutzereingabe (21, 22) für Befehle zum Ausfahren oder Zusammenklappen des oberen Teils (3) gesteuert wird.

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14. Der zusammenklappbare Mast nach Anspruch 13, wobei die Benutzereingabe (21, 22) auf oder an dem Mast angeordnet sind.

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15. Der zusammenklappbare Mast nach einem der Ansprüche 8 bis 14, wobei der Antriebsmotor (16) aus einer Gruppe ausgewählt ist, aufweisend einen Elektromotor, einen Schneckenantrieb, einen Direktantrieb, einen Linearantrieb oder dergleichen.

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Revendications

1. Mât de ou pour un yacht, **caractérisé en ce que** le mât est configuré pour être pliable en comprenant :

- une base (2) ;
- une section supérieure (3) ; et
- un mécanisme de rotation agencé entre la base et la section supérieure configuré pour faire tourner la section supérieure par rapport à la base entre un état étendu vertical (6), dans lequel la section supérieure s'étend dans le prolongement de la base, et un état plié (7), dans lequel la section supérieure est tournée vers le bas pour réduire une hauteur du mât, dans lequel le mécanisme de rotation comprend un axe (8) orienté transversalement à travers la base, dans lequel

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le mécanisme de rotation comprend un bras de rotation (9), qui est relié de manière rotative à la base par l'intermédiaire de l'axe et une plaque de montage (10) avec un trou traversant (11), dans lequel

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le bras (9) est extensible d'une longueur efficace plus courte dans l'état étendu vertical à une longueur efficace plus grande dans l'état plié pour maintenir la base et la section supérieure séparées à l'état plié et pour amener la base et la section supérieure en butée à l'état étendu vertical, dans lequel le bras extensible (9) est logé dans le trou traversant (11) de la plaque de montage (10) à l'intérieur de la section supérieure (3), **caractérisé en ce que** le mécanisme de

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rotation comprend en outre un mécanisme de traction (12, 13) s'étendant le long de la section supérieure (3) et revenant à travers un intérieur de la section supérieure jusqu'à la plaque de montage.

2. Mât pliable selon la revendication 1, dans lequel le mécanisme de traction est ancré sur une flèche (4), s'étendant latéralement à partir de la base (2).

3. Mât pliable selon la revendication 2, dans lequel le mécanisme de traction comprend un câble (12).

4. Mât pliable selon la revendication 3, dans lequel le mécanisme de traction comprend en outre un élément de traction, par exemple un ressort (13).

5. Mât pliable selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de rotation comprend un mécanisme de piste (15) et de came (14) configuré pour commander respectivement le mouvement de pliage et de redressement de la section supérieure (3) par rapport à la base (2).

6. Mât pliable selon l'une quelconque des revendications précédentes, dans lequel une interface (5) entre la base (2) et la section supérieure (3) est oblique par rapport à l'étendue du mât dans l'état étendu vertical (6).

7. Mât pliable selon la revendication 6, dans lequel l'interface (5) fait un angle d'au moins environ 45 degrés.

8. Mât pliable selon l'une quelconque des revendications précédentes, dans lequel le mécanisme de rotation comprend un moteur d'entraînement (16) agencé dans l'une ou l'autre de la base (2) et de la section supérieure (3), et une transmission (17) reliée au moteur d'entraînement et au mécanisme de rotation.

9. Mât pliable selon la revendication 8, dans lequel le moteur d'entraînement (16) est, en sortie de celui-ci, connecté à un câble flexidrive (18) menant à la transmission (17).

10. Mât pliable selon la revendication 8 ou 9, dans lequel la transmission (17) comprend, à un côté d'entrée de celle-ci, une vis mère.

11. Mât pliable selon la revendication 8, 9 ou 10, dans lequel la transmission (17) est une boîte de vitesses à broche.

12. Mât pliable selon l'une quelconque des revendications 8 à 11, dans lequel la transmission (17) comprend une entrée (19) reliée à un connecteur exter-

ne, configurée pour être engagée par un entraînement externe applicable manuellement, tel qu'une perceuse.

- 13.** Mât pliable selon l'une quelconque des revendications 8 à 12, dans lequel le moteur d'entraînement (16) est sous la commande d'un dispositif de commande avec une entrée utilisateur (21, 22) pour des instructions d'extension ou de pliage de la section supérieure (3). 5 10
- 14.** Mât pliable selon la revendication 13, dans lequel l'entrée utilisateur (21, 22) est agencée sur ou au niveau du mât. 15
- 15.** Mât pliable selon l'une quelconque des revendications 8 à 14, dans lequel le moteur d'entraînement (16) est sélectionné dans un groupe comprenant un moteur électrique, un entraînement à vis sans fin, un entraînement direct, un actionneur linéaire ou similaire. 20

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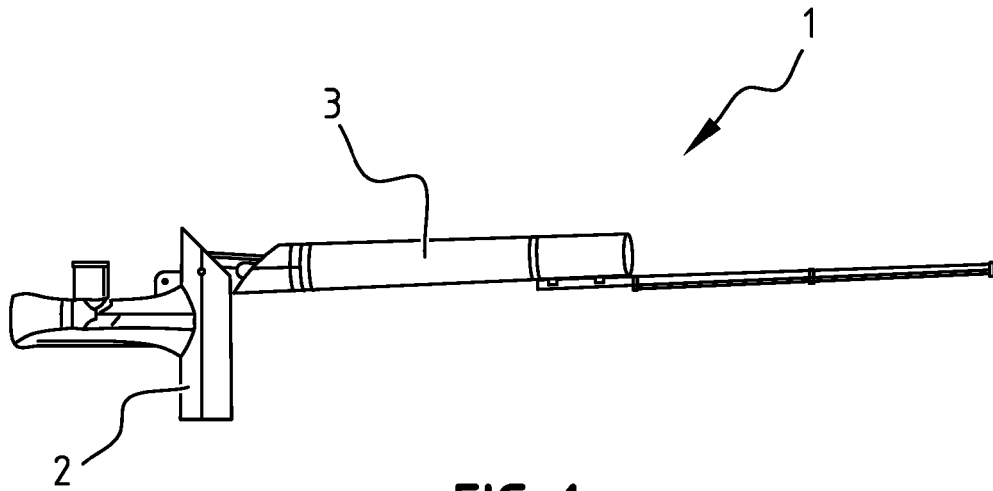


FIG. 1

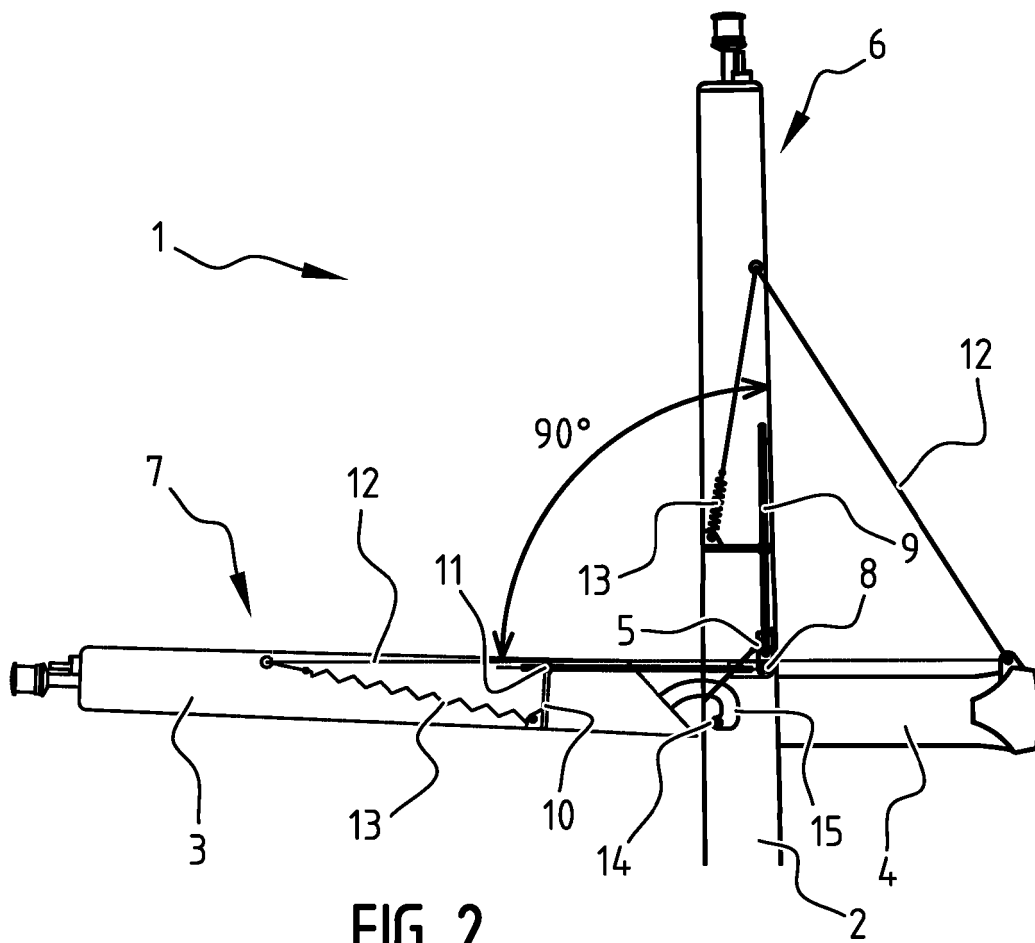
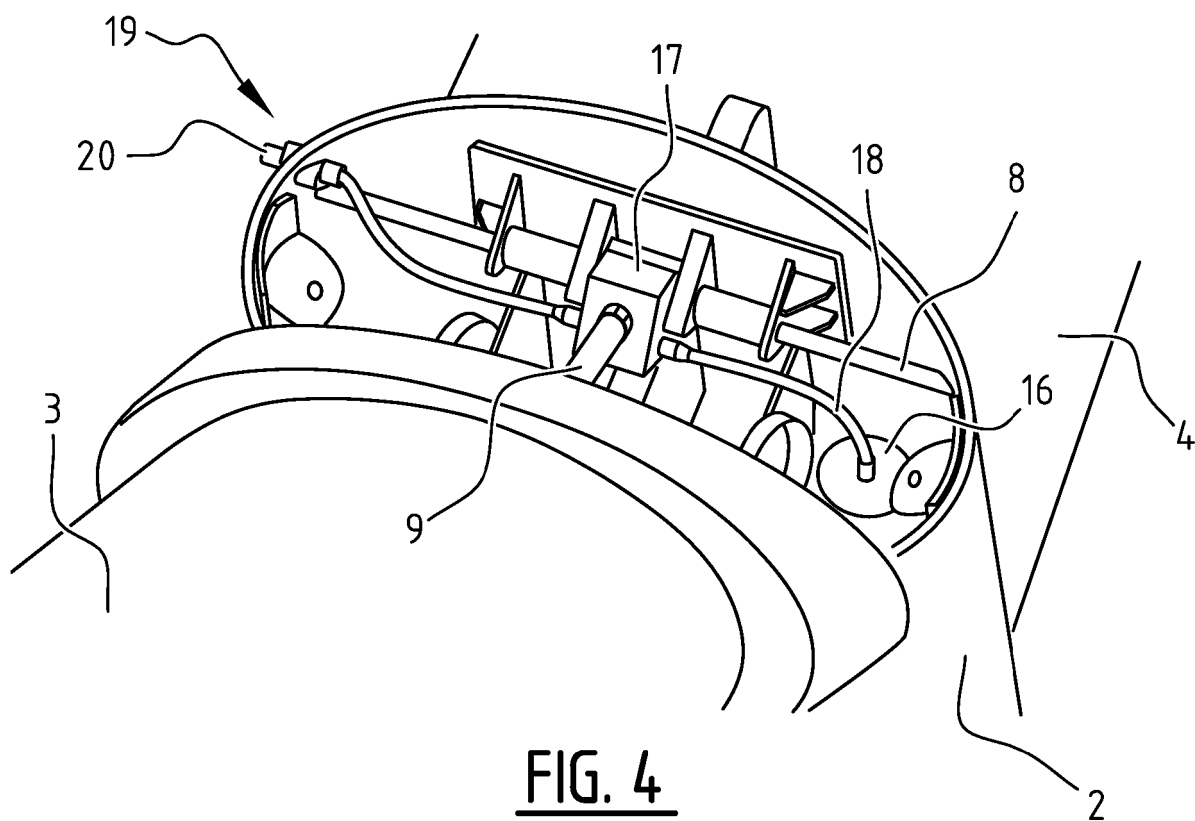
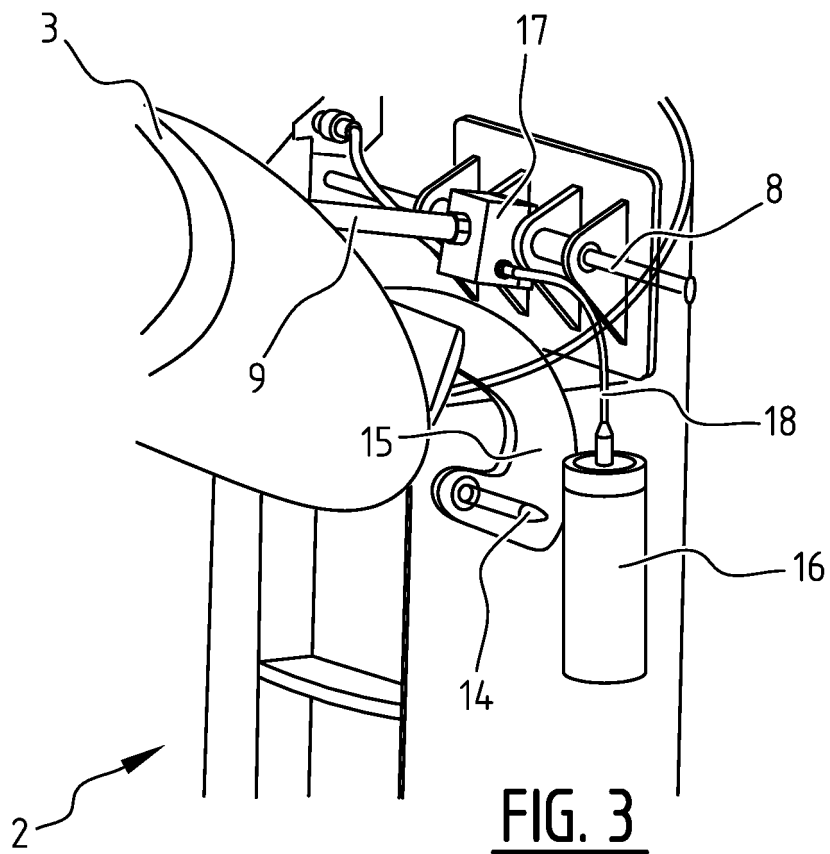
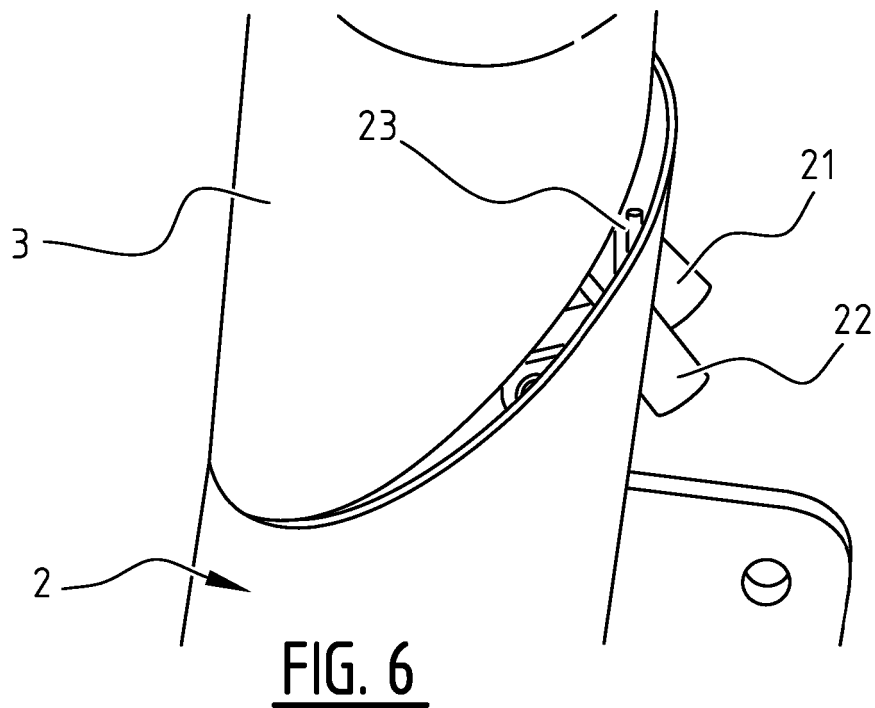
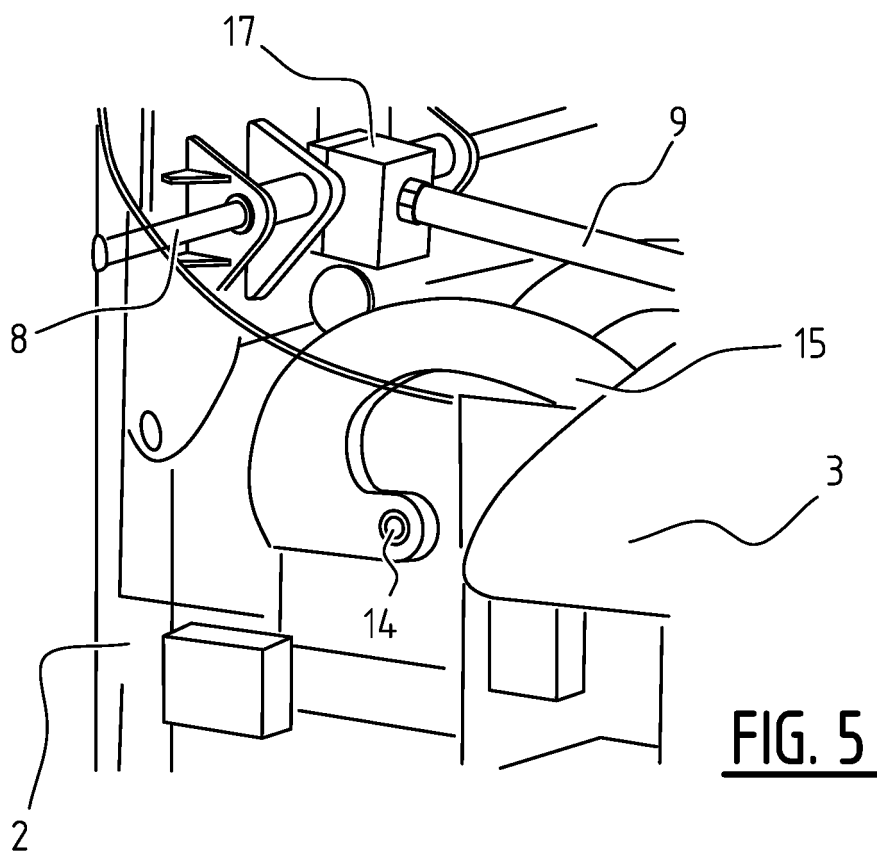


FIG. 2





REFERENCES CITED IN THE DESCRIPTION

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